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ABSTRACT

The viability of interactive video as a method of individualizing instruction was studied using classroom management situations dealing with cheating as the program content. Students completing the program were to select the correct statement about the observed student behavior in brief video scenes, the teacher action appropriate to that behavior, and the probable result of the action. The interactive program on videotape was encoded by the SONY Cue Programmer to be used with the SONY Interactive Video Responder and Printer. Subjects were 60 students enrolled in a required Admission to Teacher Education Course at Pan American University. A criterion test, used as both a pretest and posttest, consisted of four brief video scenes and three multiple-choice questions to be answered following the viewing of each scene. Results indicated no mean difference between the pretest and posttest, no mean difference between the treatment and no treatment groups, and no interaction between pretesting and treatment conditions in this pilot study. Four references are listed. (LMM)

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INDIVIDUALIZING INSTRUCTION THROUGH INTERACTIVE VIDEO

by

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INDIVIDUALIZING INSTRUCTION THROUGH INTERACTIVE VIDEO

The technological changes of the past several decades have had a great impact on society as a whole. To visually-oriented youth, television and video tapes have become essential to learning about our culture. The lives of all people, regardless of age, have also been greatly affected by the introduction of micro-computers. By and large, computers and other means of communication have developed with little cooperation or coordination. In the past, television and computers have had little impact on education. Early educational television was often no more that a televised lecture, and inferior software did not inspire educators to secure either the micro-computers nor the available software to accompany them. /1:78/

However, both television and the micro-computer are now being used extensively in education as well as in business. The development and use of realistic video programs and the development of quality software have been contributing factors in the acceptance of these media. The latest technology combining video and the micro-computer is interactive video. This technique is achieved by programing a video tape (or video disc) by interfacing it with a computer.

Troutman defines interactive video as "a technology that allows a computer program to control a video program." /2:71/ The interactive video program "combines the interactive capability of the computer with the visual impact of video." /3:71/ The video program consists of video action scenes and questions related to the scenes. The computer instructs the user (via the tape or disc) about the correctness of responses and the next appropriate action. This allows the user to advance or repeat a segment or to branch to a different segment.

Need For The Study

Although interactive video is being used in business and industry, it has yet to be used to any great extent in education. Little research, if any, has been done to determine the effectiveness of interactive video. This study using interactive video as a teaching technique was developed to provide data about improving instruction for students who are prospective teachers. "Classroom Management" was chosen as the subject content to be included in the program. Five sub topics: "Cheating," "Student Disagreements," "Being Unprepared for Class," "Defying the Teacher," and "Students Talking at Inappropriate Times," which are common classroom management problems teachers have to solve in their own classrooms, were considered. For the pilot study described in this paper only the program on " Cheating" was developed and used.

Statement of the Problem

This study proposes to determine if interactive video is a viable method for individualizing instruction. Specifically the study is designed to find out if students can make better decisions about classroom management situations dealing with cheating by individually completing an interactive video program.

Three objectives have been set for the students involved in the experiment. After they complete the interactive video program, they will be able to (1) select statements that identify observed student classroom behavior in brief video scenes, (2) select teacher action appropriate to that behavior, and (3) select the most probable result of the chosen teacher action.

The major question raised by this study follows: Can the student make significantly more appropriate decisions about how to deal with classroom cheating as a result of completing an individualized program via interactive video?

Hypothesis

In order to investigate this problem the following hypothesis was formulated and stated in null form:

> There is no difference in decisions about dealing with cheating in the classroom as a result of completing or not completing an individualized interactive video program on cheating.

Review of the Literature

Search of the Literature about the use of interactive video reveals more information about educational application by business and industry than by educators in educational institutions. "An interactive Video Casebook" summarizes current applications "of the interactive technologies . . . in this rapidly changing field." /4:35/ Some of the applications are listed below.

> IBM has been using video discs for sales personnel to learn about all the IBM products without being a specialist in each. IBM has also developed both interactive discs and videotapes for training service personnel and for communication with employees about company benefits and relocation.
>
> Bank of America has been developing an interactive video tape to teach employees how to use a 3270 type terminal and interactive video discs for training tellers in customer relations.
>
> Sears and Roebuck has been piloting a video disc catalog in the Washington, D.C. and Cincinnati areas.

Bechtel Power Corporation has developed interactive video tapes for training its construction workers to keep track of the computer which regulates the components used in their work. They are presently using this at construction sites and company offices from coast to coast and plan to use it overseas for job training.

The College of San Mateo and the California State Legislature have developed interactive training for entry-level electronics workers. The purpose is to upgrade skills and reduce unemployment.

Mead Johnson's Parmaceutical Division has used interactive technology to instruct sales personnel about new drugs.

Drew University's Center for Aerospace Education is producing laser discs on the NASA Programs. The purpose for this project is to make available the history of space flight to education and the general public at an affordable cost.

Sony Corporation used laser video disc players at the 1982 World's Fair in Knoxville to present "Energy in Perspective" and a history of energy in the United States. Viewers were able to interactively participate in a debate about energy.

Interactive video tapes for teachers who work with learning disabled students were developed by Lehigh University's Instructional Technology Center.

The New York City textbook publisher, John Wiley and Sons, Inc., has introduced The Puzzle of the Tacoma Narrows Bridge Collapse- on interactive video disc for college physics students. This uses the interactive video disc developed by Dr. Robert Fuller, University of Nebraska, through a grant from the National Science Foundation.

An interactive video disc course in high school economics has been developed by the Minnesota Education Computing Consortium, St. Paul. It will be used in rural schools where economics may not be offered otherwise.

The Massachusetts Institute of Technology has been working on expanding the technology of the optical video disc to allow film makers to personalize programs for the disc.

Student pilots are receiving training via interactive video tapes at Embry-Riddle Aeronautical University in Bunnell, Florida. The purpose of incorporating this technology is to reduce the actual flight time needed for training.

Limitations of the Study

This study is limited to students in ED 2100, Admission to Teacher Education, a required course for all education majors and others seeking teacher certification at Pan American University. The four sections participating in the study were randomly selected.

The video test and interactive video program on cheating were developed by the researchers. Students from Pan American University, not involved in the experiment, acted out the scenes for the test and the interactive video program.

This study was conducted as a pilot study.

The Design of the Study

The ability to use a variety of teaching techniques and resources is an important goal for students to achieve in a professional teacher preparation program. Application of a variety of teaching methods in courses for these students has been a practice of the researchers. Also the inclusion of individualized instructional modules into the curriculum has been part of the program development, but only on a very limited basis. Using interactive video as a learning mode would provide an additional technique in the teacher education program to provide for individualized learning, using the latest technology.

The interactive video tape or disc can be used for interactive or passive group presentations as well as for individualized self-paced instruction. The program can be stored on the tape or disc and the video tape or disc can be controlled by a microcomputer or responder. The researchers produced this interactive video program on video tape, which was then encoded by the Sony VRC-100 Cue Programmer so that it could be used with the Sony Interactive VRS-100 Video Responder and the VRP-100 Printer.

The goal of the researchers is to investigate the use of interactive video as a method of improving instruction for students enrolled in the teacher education program. They have chosen interactive video because it is a multi-sensory technique of programmed instruction, which requires active learner participation.

Population for the Study

The population selected for the study during the spring semester, 1982, consisted of sixty students enrolled in four sections of ED 2100, Addmission to Teacher Education. This selection was made because (1) this is a required course for admission into the teacher education program for all undergraduate education majors and all other discipline majors seeking teacher certification; (2) these students are generally enrolled in Ed 2100 at the beginning of their professional preparation courses.

Classroom Management Situations

The program content chosen for instruction is the area of classroom management. How to handle a specific classroom situation is an important decision for the teacher in the teaching/learning process. Five types of classroom management situations selected for program content are those commonly occuring in public schools classrooms: students cheating, students coming unprepared to class, students defying the teacher, students talking at inappropriate times, and student disagreements. The topic cheating was selected to be developed for this experiment as a pilot study.

The objectives for the pilot program on cheating are as follows:

After completing an interactive video program, the student will be able to
(1) select statements that identify observed student behavior in brief video scenes,
(2) select teacher action appropriate to that behavior,
(3) select the most probable result of the chosen teacher action.

Development of the program consisted of planning visual scenes showing cheating and the verbal dialogue to accompany each, writing multiple-choice questions to follow each scene, and video taping each. Then the scenes and questions were edited to make the video tape.

This video tape was then programmed by a cue programer to be used with the Sony Video Responder system. This allows the student to get immediate feedback on the answer chosen and the opportunity to review any segment that was missed on a first attempt.

Measuring Instrument

The test developed by the researchers, using the same format as the interactive video program, consisted of four brief video scenes. Students were asked to answer three multiple-choice questions about each scene. After viewing each scene, the students read the test questions from a written test and recorded their answers on an answer sheet. The same test was used for both pre and posttest.

Students in two sections of Ed 3301 Instructional Technology, were used to pilot the test (fall 1981) for this pilot study. Some refinements of the test questions followed this step of the procedure.

The pre and posttest was constructed to measure the students' ability to:

1. identify the student behavior in the scene accurately,
2. select appropriate teacher action to deal with the behavior identified,
3. select the most probable result of the teacher's action.

Specifically, the questions to which students responded after viewing each scene are (1) "What is happening?"; (2) "If you are the teacher, what will you do?" (3) "What will be the probable result of your action?"

Procedure

This step-by-step procedure was followed in developing the program for the interactive video system:

1. The learning concepts and the methodology of interactive video were identified. (May, 1981)
2. Specific objectives were formulated.
3. A criterion (pre and post) test was developed to measure objectives.
4. A program was completed to include:
   a. Video taped classroom situations on cheating.
   b. Verbal questions and responses, which were developed and and transferred to a character generator.
5. The classroom situations and verbal questions were edited onto the interactive video tape.
6. Interactive video cues were encoded.
7. Test was piloted with two groups of students and refined.
8. Students were pretested for the pilot study.
9. Students in the treatment groups used the interactive video program for the pilot study.
10. All students in the pilot study were posttested.
11. Results were treated statisically.
12. Results were analyzed and evaluated.
13. Revisions were planned.

Experimental Design [5]

The Solomon four-group design was chosen for this experiment because it is a blend of experimental design and statistical analysis. Figure 1 illustrates the group assignment for treatment or nontreatment and prettesting or nonpretesting.

Figure 1
Group Assignment

	Randomly Assigned	Pretest	Treatment	Post test
Group 1	R	O_1	X	O_2
Group 2	R	O_3		O_4
Group 3	R		X	O_5
Group 4	R			O_6

Figure 2 is a paradigm showing the statistical analysis of the design.

Figure 2
Statistical Analysis

	No Treatment	Treatment
No pretest	O_6	O_5
pretest	O_4	O_2

Methods and Procedures

The Solomon four-group design (Fixed Model or Model I Design) is the research design utilized in the present study (See Figure 1). This design blends the use of experimental control and statistical partitioning of effects. This particular design allows for partitioning of treatment effects, pretesting effects, and pretesting and treatment interaction effects.

In the present study the method of statistical analysis is a two-way (2 x 2) analysis of variance (ANOVA). A random sample was obtained, and the subjects were randomly assigned to the treatment and nontreatment groups. The cell sizes are equal. The dependent measure had interval scaling and was individually administered. Also the assumptions of homogeniety of variance and normality of distribution are supported.

In addition, an analysis of covariance was used to compare the posttest treatment and posttest nontreatment groups' adjusted means, controlling for age, sex, and pretesting differences.

The above experimental design and methods of statistical analysis were used to address the research hypothesis: there is a mean difference between treatment (group receiving interactive video program) and nontreatment (comparison) groups.

Results

The results of the statistical tests applied to the data indicate there is no mean difference between pretest and posttest, no mean difference between the no treatment and treatment groups, and no interaction effect between pretesting and treatment conditions (See Table 1).

TABLE 1

Means for Treatment and Non Treatment,
Pretesting and No Pretesting and Cells
and Two-Way (2 x 2) Factorial Analysis of Variance

Cell effects	N	$\bar{X}$	Main effects	N	$\bar{X}$
No treatment X no pretest	15	7.53	No Treatment	30	7.60
No treatment X pretest	15	7.67	No Treatment	30	7.73
Treatment X no pretest	15	7.93	Treatment	30	7.90
Treatment X pretest	15	7.87	Pretest	30	7.77

Source of Variation	SS	DF	MS	F
Pretesting; no pretesting Effect	.017	1	.017	.004
Treatment; non treatment effect	1.35	1	1.35	.354
Pretesting Interaction with Treatment effect	.149	1	.149	.039
within groups (error term)	213,734	56	3.817	
Total	215,25	59		

Analysis of covariance of treatment and non treatment groups' adjusted posttest mean with pretesting as the covariate yielded no adjusted posttest mean difference ($p > .05$) (See Table 2).

TABLE 2

Analysis of Covariance of Posttest Means with Pretesting the Covariate

Source	Sum of Squares	DF	Mean Squares	F
Between adjusted treatment	.300	1	.300	.165
Error	49.156	27	1.821	
Total	49.456	28		

Anaylsis of covariance of treatment and non treatment groups' adjusted posttest mean with sex as the covariate yielded no adjusted posttest mean difference ($P. > .5$) (see table 3).

TABLE 3

Analysis of Covariance of Posttest Means with Sex the Covariate

Source	Sum of Squares	DF	Mean Squares	F
Between adjusted treatment	1.514	3	.505	.130
Error	212.99	55	3.87	
Total	214.507	58		

Analysis of covariance of treatment and non treatment groups' adjusted posttest mean with age as the covariate yielded no adjusted posttest mean difference ($P > .05$) (See table 4).

TABLE 4

Analysis of Covariance of Posttest Means with Age the Covariate

Source	Sum of Squares	DF	Mean Squares	F
Between adjusted treatment	2.006	3	.689	.178
Error	212.973	55	3.872	
Total	215.0389	58		

Analysis Summary

The results derived from the statistical analysis indicate there is no mean difference between the treatment and no treatment groups in the present pilot study. Those students who completed the interactive video program did not score higher in the posttest than did the students who did not complete the program.

The results obtained with a two-way (2x2) factorial analysis of variance failed to reject the null hypothesis: there is no mean difference between treatment and no treatment groups. After comparing the treatment and non treatment groups, no difference in knowledge about dealing with cheating in the classroom as a result of completing or not completing an individualized interactive video program on cheating was obtained.

An analysis of covariance between posttest treatment and posttest no treatment groups' adjusted means yielded no significant difference with the three covariates age, sex, and pre-testing effects.

On the basis of the statistical analysis for the present pilot study, the research hypothesis was not supported.

SUMMARY

This study was conducted to determine if interactive video is a usable metnod of individualizing instruction. Classroom management situations dealing with cheating were chosen as the content for the interactive video program. Three objectives for students completing the program were to select the correct statement about (1) observed student behavior in brief video scenes, (2) the appropriate teachers actions, and (3) the probable result of the action.

For this study the following hypothesis was formulated and stated in null form:

> There is no difference in decisions about dealing with cheating in the classroom as a result of completing or not completing an individualized interactive video program about cheating.

The interactive video program and the video test on cheating were developed by the researchers. Students form Pan American University, not involved in the experimental study, acted out the scenes for the test and the program. The interactive video program on video tape was encoded by the Sony Cue Programmer to be used with the Sony Interactive Video Responder and Printer.

The population for the study was sixty students enrolled in four sections of a required Admission to Teacher Education course.

A criterion test to be used as both pre and post measuring instrument was developed. It consisted of four brief video scenes for students to view and then answer three multiple-choice questions about each scene.

The Solomon four-group design was chosen for this experiment because it allows for partioning of treatment effects, pretesting effects, and pretesting and treatment interaction effects. The 2 X 2 factorial analysis of variance (ANOVA) was the statistical analysis applied to the data.

In addition, an analysis of covariance was used to compare the post-test treatment and posttest non treatment groups' adjusted means, controlling for age, sex, and pretesting differences.

CONCLUSIONS

The data were obtained through a Solomon four-group design and analyzed by analysis of variance and covariance. The results of the statistical tests applied to the data indicate there is no mean difference between pretest conditions, no mean difference between the no treatment groups, and no interaction between pretesting nad treatment. Thus, the null hypothesis was not rejected. The analysis of covariance yielded no difference between adjusted posttest means for the nontreatment and treatment groups with pretesting, sex, and age as covariates.

IMPLICATIONS FOR FURTHER RESEARCH

The research hypothesis was supported by the statistical analysis of the data produced in this experiment. This does not, however, provide conclusive evidence about the effectiveness of interactive video as an individualized teaching method.

This brief interactive video program was intended to be used in a pilot study only. It provided the researchers with the experience in developing interactive programming on video tape. It also provided an opportunity to observe student use of and attitudes toward interactive video instruction. Of the thirty students who completed the interactive video program, twenty-nine stated in a written questionaire that they had enjoyed completing the program and felt they had learned from the experience.

The lack of obtained difference between treatment condition means reflected in the analysis of statistical results may be attributed to the brevity of the test and of the program. Cheating is only one sub-topic of classroom management. The criterion test on cheating was limited to four brief scenes and a total of twelve questions. The need for additional research is indicated. The researchers plan to refine this pilot program and the test on cheating. In addition, they paln to expand this experiment to inlcude other sub-topics on classroom management.

Footnotes

1. Bejar, Isaac I. "Videodiscs in Education," Byte Publications, Inc. June, 1982 p.78.

2. Troutman, Joanne, "How to Produce an Interactive Video Program," Electronic Learning, January, 1983, p.71.

3. Ibid.

4. "An Interactive Video Casebook," EITV, Vol 14, No. 6, June, 1982, p. 35.

5. Dr. Ralph Carlson, Associate Professor of Education, Pan American University assisted the researchers in selecting the experimental design and by analyzing and interpreting the data.